

Installation, Start-Up and Service Instructions for Sizes 045-095



NOTE: Energy Guide tag may be removed from furnace when installation is complete.



INTRODUCTION

Before installing the furnace, refer to Procedures for Gas-Fired Furnaces (packaged with the equipment) for information concerning combustion, venting, piping, and other standard installation practices. Further reference is made to the current edition of the National Fuel Gas Code, NFPA54-1984/ANSI Z223.1-1984.

Each furnace is shipped from the factory completely assembled with multispeed direct-drive blower and wired ready for counterflow indoor heating installation only. All sizes feature a printed-circuit board control center with easy-to-read, low-voltage terminal strip to ensure proper connections.

⚠ CAUTION

Do not install furnace in a corrosive or contaminated atmosphere. Make sure all combustion and circulating air requirements listed in Procedures for Gas-Fired Furnaces are adhered to, in addition to all local codes and ordinances.

⚠ CAUTION

Do not block openings in front of furnace or on furnace top along side vent pipe. These openings provide air for combustion and ventilation. Never store anything on or in contact with furnace, such as: aerosol cans, rags, brooms and mops, cleaning tools and aids, powders, bleaches, waxes, plastic items, gasoline, kerosene, lighter fluids, cleaning fluids, thinners, painting compounds or paper products.

The design of the counterflow gas-fired furnace is A.G.A. certified for installation on combustible flooring (with optional floor base), in alcoves, basements, closets or utility rooms. This furnace line is *not* A.G.A. certified for installation in a mobile home, recreation vehicle, or outdoors

Installation Procedures:

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*Refer to appropriate sections in Procedures for Gas-Fired Furnaces packed with this furnace

For accessory installation details, refer to applicable installation literature.

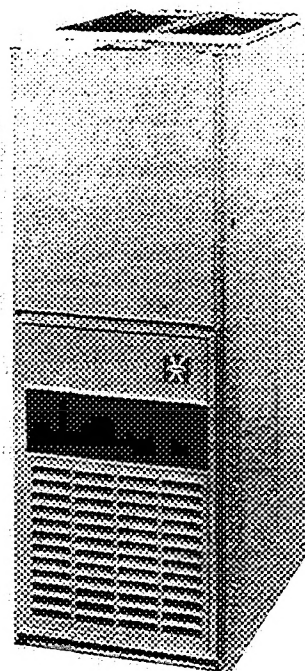


Fig. 1 — Model 58DRC

Table 1 — Clearances (in.)

SIZE 58DRC		ALL
Sides	Single-Wall Vent	1
	Type-B1 Double-Wall Vent	1
Back		0
Top of Plenum		1
Vent Connector	Single-Wall	6
	Type-B1 Double-Wall	1
Front	Combustion Air	6
	Service	30

NOTE: Some furnaces are shipped with paper across the supply-air outlet. Remove the paper before installing furnace.

INSTALLATION

Supply-Air Plenum Installation

INSTALLATION ON A CONCRETE SLAB

- 1 See Fig. 2 for dimensions and location of supply air opening in furnace bottom

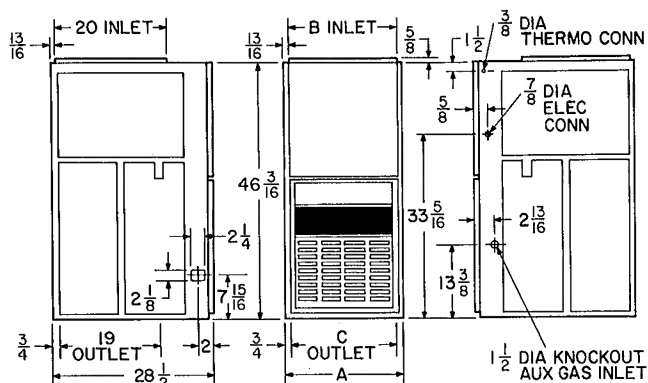


Fig. 2 — Dimensions (in.)

Table 2 — Dimensions (in.)

SIZE 58DRC	A	B	C	VENT
045	17 1/2	15 5/8	16	4
065	17 1/2	15 5/8	16	5
080	21	19 3/8	19 1/2	5
095	24 1/2	22 13/16	23	6

- Construct hole in floor per dimensions in Fig. 3 and Table 4.
- Place plenum and furnace as shown in Fig. 4.

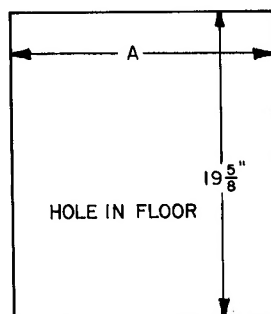


Fig. 3 — Floor Opening

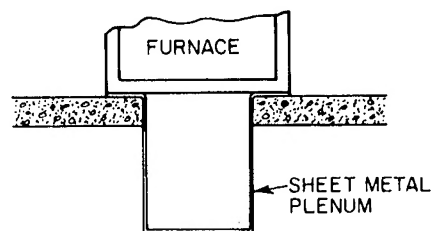


Fig. 4 — Furnace on a Concrete Slab

Table 4 — Floor Opening Dimensions (in.)

SIZE 58DRC	A
045, 065	16 7/16
080	19 1/8
095	23 7/16

INSTALLATION ON A COMBUSTIBLE FLOOR

- Read Installation Instructions packaged with combustible floor base. See Fig. 5.
- Cut and frame hole in floor per dimensions in Fig. 3 and Table 4. If this requires cutting a floor joist, tie ends of cut joist into adjacent joists so that proper floor support is maintained.
- Assemble and install combustible floor base per instructions packaged with base.
- When completed, combustible floor base, plenum, and furnace (or coil casing when used) should be installed as shown in Fig. 6.

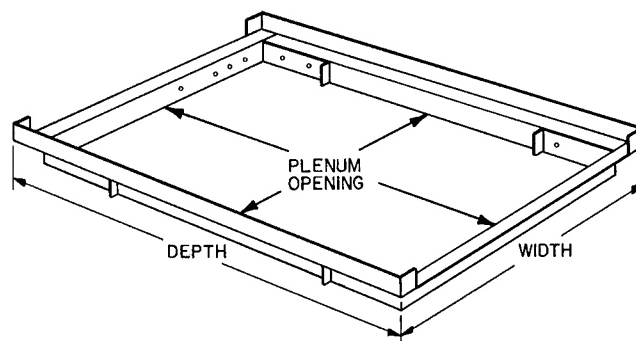


Fig. 5 — Combustible Floor Base

Table 3 — Ratings and Performance*

SIZE 58DRC	INPUT BTUH	HEATING CAPACITY (BTUH)**	TEMP RISE RANGE (F)	HEATING†		COOLING‡		MOTOR HP (PSC)	APPROX SHIP. WT (lb)
				Ext Static Pressure (in. wg)	CFM	Ext Static Pressure (in. wg)	CFM		
045CB	60,000	45,000	30-60	12	1080	0.5	1206	1/3	157
065CB	80,000	65,000	30-60	12	1240	0.5	1630	1/2	170
080CB	100,000	80,000	40-70	15	1165	0.5	1620	1/2	187
095DB	120,000	95,000	40-70	20	1830	0.5	2075	1/2	227

PSC — Permanent Split Capacitor

*Ratings are certified for altitudes to 2000 feet. For elevation above 2000 ft, reduce ratings 4% for each 1000 ft above sea level.

†CFM at #3 speed tap

‡CFM at #1 speed tap

**Preliminary data.

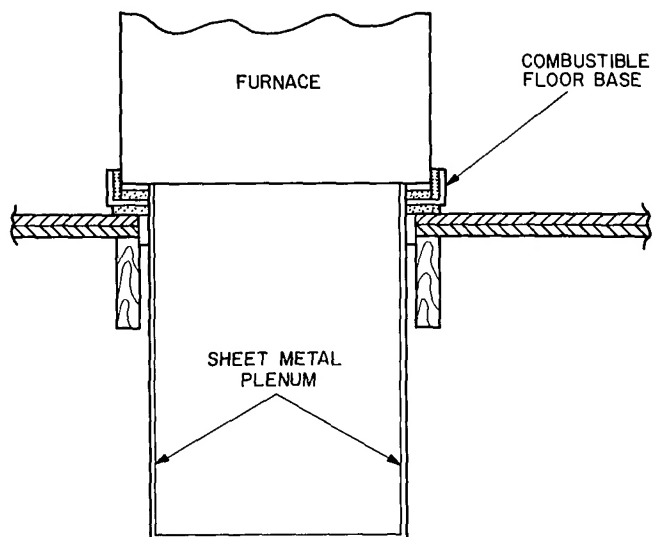


Fig. 6 — Furnace, Plenum, and Base Installed on a Combustible Floor

Electrical Connections

LINE-VOLTAGE WIRING

NOTE. For additional information, refer to Procedures for Gas-Fired Furnaces (packaged with the equipment)

IMPORTANT: Before proceeding with the electrical connections, make certain that voltage, frequency, and phase correspond to that specified on the unit rating plate. Also, be sure that the service provided by the utility company is sufficient to handle the additional load imposed by this equipment.

⚠ CAUTION

Do not connect aluminum wire between disconnect switch and furnace.

See Fig. 7 for wiring diagram showing the proper field high- and low-voltage wiring. Make all electrical connections in accordance with the National Electrical Code ANSI/NFPA 70-1984 and any local codes or ordinances that might apply.

Use a separate fused branch electrical circuit for this furnace. A disconnecting means must be located within sight from, and readily accessible from the furnace. In some areas, the unit door switch may qualify as the disconnecting means.

⚠ WARNING

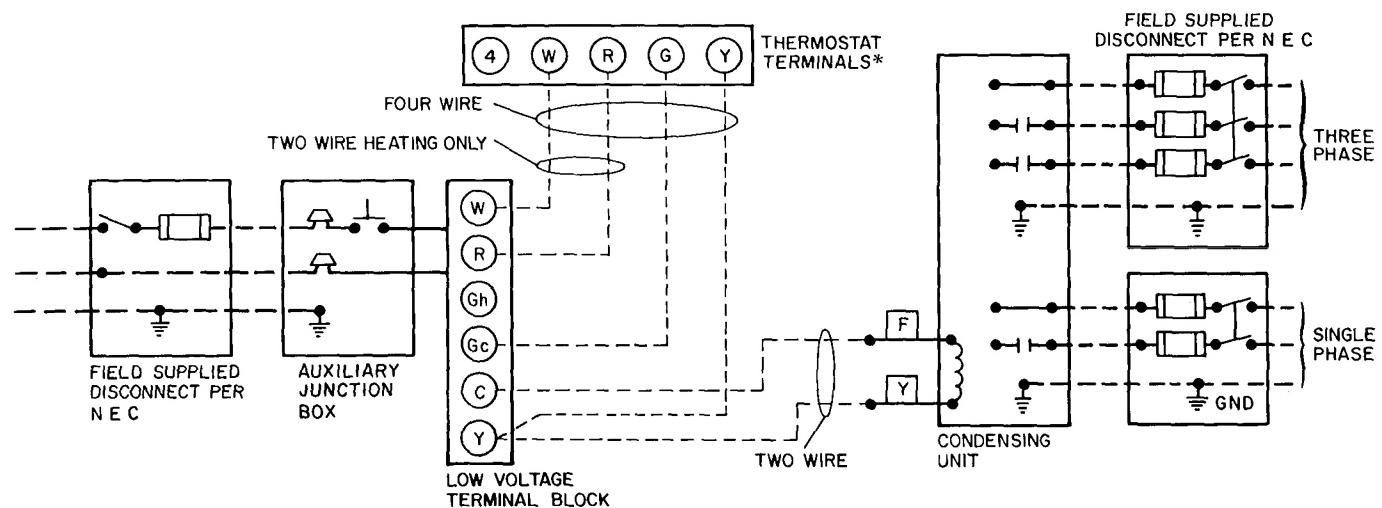
The furnace must be electrically grounded in accordance with local codes, the National Electric Code, ANSI/NFPA 70-1984. Do not use gas piping as an electrical ground.

If line voltage wiring to the unit is encased in a non-metallic sheath, connect the incoming ground wire to the grounding wire inside the furnace junction box. If metallic conduit is used, it will serve as the ground.

LOW-VOLTAGE WIRING — Make field low-voltage connections at the low-voltage terminal strip. See Fig. 7.

NOTE: Use AWG no. 18 color-coded copper thermostat wire for lengths up to 100 feet. Above 100 ft, use AWG no. 16 wire.

IMPORTANT The thermostat heat anticipator must be set to match the amp draw of the gas valve and electrical components in the R-W circuit. Accurate amp draw readings can be obtained at thermostat subbase terminals R and W. Figure 8 illustrates an easy method for obtaining the actual amp draw.



*Some thermostat subbases require a jumper wire between subbase terminals R and 4 for proper operation in heating and cooling applications that use a single transformer.

NOTE: If any of the original wire as supplied must be replaced, use same type or equivalent wire.

--- Field Low-Voltage Wiring
- - - Field High-Voltage Wiring
_____ Factory Low-Voltage Wiring

Fig. 7 — Heating and Cooling Application Wiring Diagram

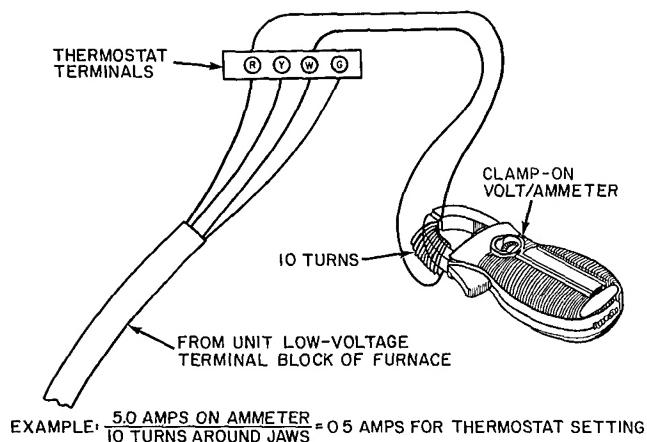


Fig. 8 — Amp Draw Check with Ammeter

The room thermostat should be located where it will be in the natural circulation path of room air. Avoid locations where the thermostat would be exposed to cold-air infiltration, drafts from windows, doors, or other openings leading to the outside, or exposure to air currents from warm- or cold-air registers; or to exposure where the natural circulation of the air is cut off — such as behind doors, above or below mantels, shelves, etc.

The thermostat should not be exposed to heat from nearby fireplaces, radios, televisions, lamps, or rays from the sun. Nor should the thermostat be mounted on a wall containing pipes or warm-air ducts, or a flue or vent that could affect its operation and prevent it from properly controlling the room temperature. Any hole in the plaster or panel through which the wires pass from the thermostat should be adequately sealed with suitable material to prevent drafts from affecting the thermostat.

PRINTED-CIRCUIT CONTROL CENTER — Each furnace features a printed-circuit control center. This will aid the installer and service technician when installing and servicing the unit. See Fig. 9. A low-voltage terminal board is marked for easy connection of field wiring.

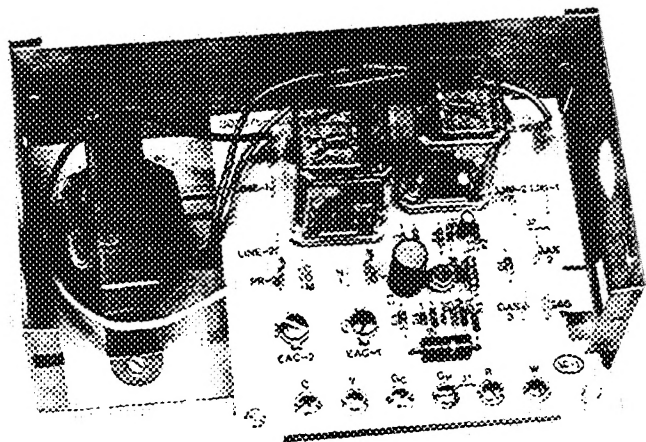


Fig. 9 — Printed-Circuit Control Center

Sequence of Operation

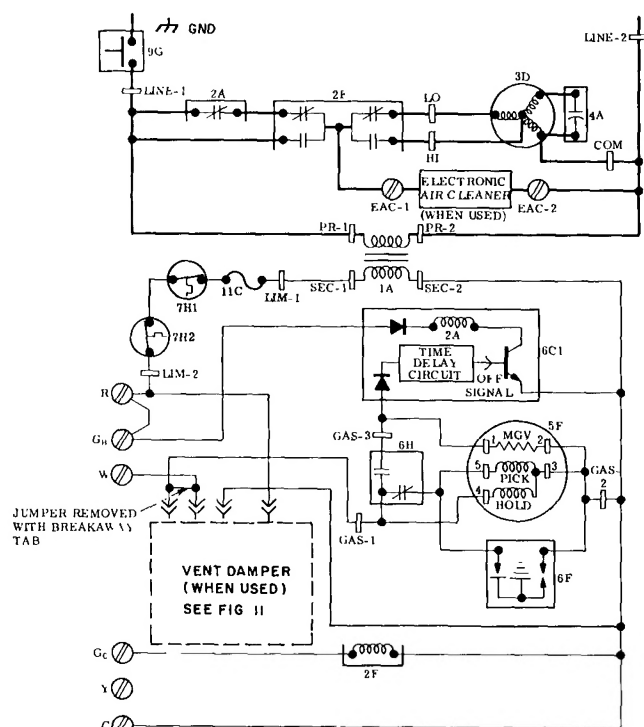
NOTE: The wiring diagram shown in Fig. 10 is for heating/cooling units.

HEATING — Gas and electrical supplies must be turned on at the furnace.

NOTE: When power is applied to heat relay coil 2A in the control circuit, the normally closed contacts in the blower circuit will open.

BDP 646 Gas Valve (IID Models) — When the thermostat calls for heat, the control circuit is closed between terminals R and W. Power from transformer 1A through fusible link 11C and limit switches 7H1/7H2 energizes the pilot valve portion of automatic gas valve 5F and pilot igniter 6F. The pilot valve opens, permitting gas flow to the pilot burner where it is ignited.

The pilot valve portion of automatic gas valve 5F is a solenoid consisting of a PICK and a HOLD coil. Both the PICK and the HOLD coils must be energized to open the valve, but only the HOLD coil must be energized to keep it open.



- | | |
|-----------------------------------|--|
| 1A — Transformer 115/24 | 7H1 — Limit Switch (SPST-N C) |
| 2A — Relay-Heat (SPST-N C) | 7H2 — Auxiliary Limit Switch (SPST-N C) Manual Reset |
| 2F — Relay-Cool (DPDT) | 9A — Summer/Winter Switch (if equipped) |
| 3D — Blower Motor | 9G — Blower Door Switch (SPST-N O) |
| 4A — Run Capacitor | 11C — Fusible Link |
| 5F — Gas Valve (2-Circuit) | |
| 6C1 — Printed-Circuit Board | |
| 6F — Pilot Igniter | |
| 6H — Safety Pilot (Flame Sensing) | |

Fig. 10 — Line-to-Line Wiring Diagram for Sizes 045-095 IID Natural Gas

When the pilot flame is established, pilot 6H switches its contacts in approximately 40 to 60 seconds, energizing the main valve portion of gas valve 5F and de-energizing pilot igniter 6F and the PICK coil portion of the pilot solenoid in gas valve 5F.

The main valve portion of gas valve 5F is heat motor operated; therefore, after approximately 10 seconds, this portion of the valve opens, permitting gas flow to the main burners where the gas is ignited by pilot 6H.

BLOWER CIRCUIT — With power through the solid-state time-delay circuit on printed-circuit board 6C1 and heat relay 2A, blower motor 3D is energized on heating speed approximately 75 seconds after the pilot flame has been proven.

LIMIT CONTROL — If the furnace overheats for any reason, limit control 7H1 switches, breaking the circuit to automatic gas valve 5F. The gas valve closes immediately, stopping gas flow to the main burners and the pilot. In addition, blower motor 3D continues to operate because heat relay 2A is de-energized to cool down the furnace.

Manual reset auxiliary limit switch 7H2 is located on the top right-hand corner of the furnace. In the event of blower motor failure, this switch breaks the electrical circuit to the gas valve, stopping gas flow to the main burners. The switch must be manually reset after the blower motor has been replaced.

Fusible link 11C is provided in the transformer 1A secondary circuit as protection from overheating conditions in the vestibule area of the furnace. Should this condition exist, the fuse opens and de-energizes gas valve 5F and heat relay 2A, stopping the gas flow to the burners and starting blower motor 3D.

When the thermostat is satisfied, the circuit between R and W is broken, de-energizing automatic gas valve 5F, pilot 6H, and the solid-state time-delay circuit on printed-circuit board 6C1. The gas flow stops immediately to the pilot and main burners with the BDP 646 gas valve. After approximately 105 seconds, heat relay 2A is energized and blower motor 3D stops.

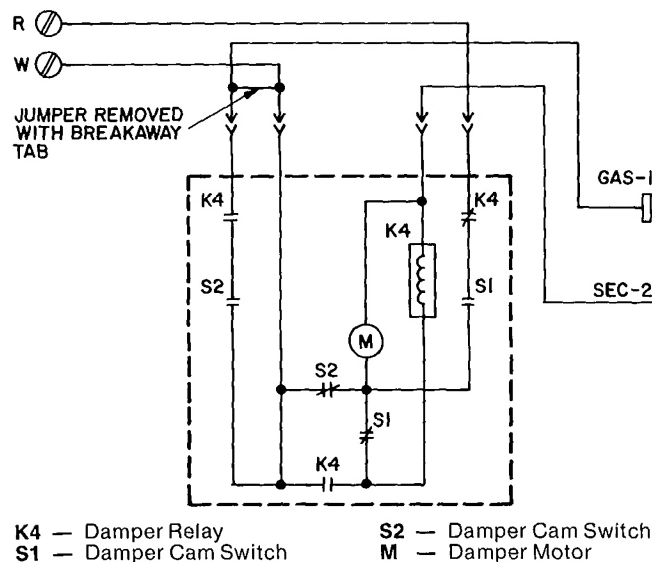


Fig. 11 — Circuit for 58GS/SE Vent Damper

MODEL 58GS/SE VENT DAMPER (when used) — With gas and electrical power supplied to the furnace, the vent damper is in the closed position. On a call for heat by the thermostat, the vent damper motor is energized and the damper opens. When the damper reaches full open position, the transformer energizes the gas valve.

When the thermostat is satisfied, it de-energizes the gas valve and stops the gas flow. The vent damper motor energizes and closes the damper. The damper remains closed until the next thermostat cycle.

COOLING (cooling models only) — When the thermostat calls for cooling, power from transformer 1A energizes the condensing unit contactor, cooling relay coil 2F, closing its contacts and energizing blower motor 3D on its cooling speed. It continues to operate until the thermostat is satisfied.

When the thermostat is satisfied, the circuit to terminal Gc is broken, de-energizing cooling relay coil 2F which, in turn, opens its contacts, stopping blower motor 3D.

Filter Arrangement — The 2 factory-supplied filters are shipped in the blower compartment. After the return-air duct has been connected to the furnace, install the filters in a V-formation inside the return-air plenum. See Fig. 12.

⚠ WARNING

Never operate unit without a filter or with filter access door removed.

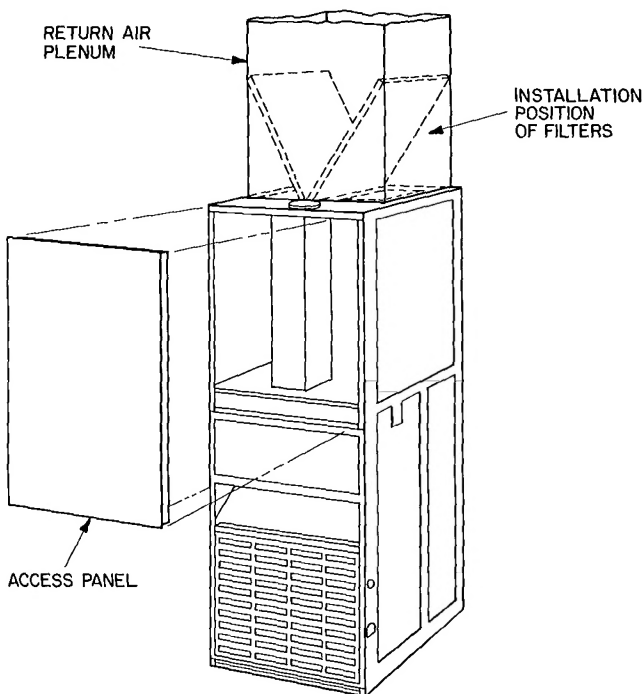


Fig. 12 — Position of Filters

START-UP AND ADJUSTMENT

In addition to the following information, refer to Procedures for Gas-Fired Furnaces packaged with the unit.

NOTE: There is a switch located in the blower compartment that breaks the electrical power supply when the blower access door is removed. Be sure blower access door is properly installed.

⚠ CAUTION

This furnace is equipped with a fusible link in the vestibule area that will melt if an overheating condition caused by an inadequate combustion air supply or improper venting practices develops. *Do not* jumper this fuse. Correct the condition and replace the fuse with an identical part.

The gas service pressure must not exceed 14 in. wg (8.1 oz) for natural gas, or 11 in. wg (6.3 oz) for LP (propane) gas.

NOTE: The gas valve regulator has been factory-set at 3.5 in. wg for natural gas and 10.5 in. wg for LP (propane) gas. Refer to Procedures for Gas-Fired Furnaces when checking input.

Adjustment of Blower Speed

⚠ WARNING

Disconnect the electrical power before changing the speed tap.

To change motor speed taps, remove the motor tap lead (see Table 5) and relocate it on the desired terminal on the plug-in terminal block/speed selector located on the blower.

⚠ CAUTION

When adjusting the blower speed, make certain that the temperature rise across the heat exchanger does not exceed that specified on the rating plate.

Table 5 — Speed Selector

SPEED	COLOR	TAP NO.
Common	White	C
Hi	Black	1
Med-Hi	Yellow	2
Med-Low	Blue	3
Low	Red	4

Automatic Gas Control Valve — These units are equipped with an automatic gas control valve. See Fig. 13. If not already checked when lighting the main burner, check the proper operation of this valve by moving the room thermostat pointer above and below room temperature and observing that the main burners light on call for heat and go off when the pointer is moved below room temperature setting.

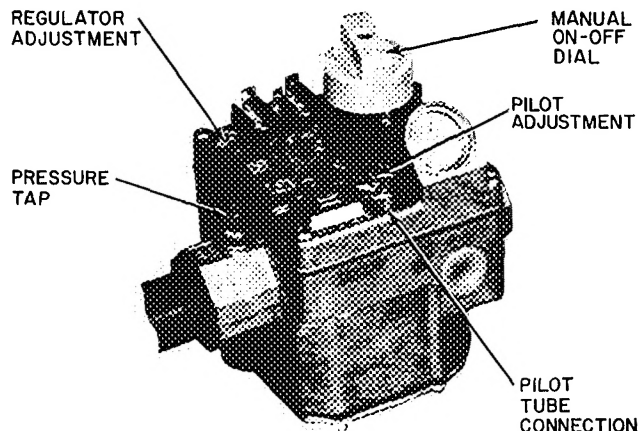


Fig. 13 — Redundant Automatic Gas Control Valve — BDP Model 646

NOTE: For ease of adjusting the pilot flame, disconnect one power lead at main gas valve. For Model 646 gas valve, disconnect terminal no. 1. This will prevent main burner ignition and allow time to adjust the pilot. Reconnect the power lead after adjustment.

CARE AND MAINTENANCE

⚠ CAUTION

Because of possible damage to the equipment or personal injury, maintenance should be performed by qualified service agency.

⚠ WARNING

Never store anything on, or in contact with, the furnace, such as

1. Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners, or other cleaning tools.
2. Soap powders, bleaches, waxes or other cleaning compounds, plastic or plastic containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.
3. Paint thinners and other painting compounds, paper bags or other paper products

For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult your local dealer as to the proper frequency of maintenance and the availability of a maintenance contract.

The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these, contact your dealer for maintenance.

⚠ WARNING

Turn off gas and electrical supplies to unit before performing any maintenance or service on unit. Follow relighting instructions on plate attached to furnace.

The minimum maintenance that should be performed on this equipment is as follows.

1. Check and clean or replace air filter each month or as required.
2. Check blower motor and wheel for cleanliness and lubrication each heating and cooling season. Clean and lubricate as necessary.
3. Check electrical connections for tightness and controls for proper operation each heating season. Service as necessary.

⚠ WARNING

As with any mechanical equipment, personal injury can result from sharp metal edges, etc.; therefore, be careful when removing parts.

Air Filter — Each furnace accommodates 2 filters which are installed above the furnace in the return-air plenum. See Fig. 12.

To clean or replace the filters, proceed as follows:

1. Disconnect electrical power before removing access panel.
2. Remove upper access panel.
3. Reach up behind top plate, tilt filters toward center of return-air plenum, remove filters, and replace or clean as needed.
4. Some furnaces are equipped with reusable, washable filters.
 - a. Clean with tap water.
 - b. Rinse and let dry. No oiling or coating of filters is required.
 - c. Reinstall filters with cross-hatch binding facing blower.

Blower Motor and Wheel (Fig. 14) — Clean and lubricate as follows:

1. Remove upper access panel.
2. Loosen screw in vent pipe enclosure front and remove vent enclosure front by sliding forward (toward front of unit).
3. Disconnect vent pipe at first joint above unit and swing vent pipe assembly to the side, supported by suitable means (block of wood, etc.).
4. Slide vent pipe upward through the rectangular opening in top plate and remove vent pipe from furnace.
5. Remove 4 screws in vent pipe enclosure back and remove enclosure back by tilting top toward blower, and sliding bottom toward front of furnace.
6. Disconnect electrical leads from right side of Molex speed selector. Note location of wires for reassembly.
7. Remove screws holding blower assembly against blower deck and slide blower assembly out of furnace.
8. Squeeze side tabs of Molex speed selector and pull it from blower housing.
9. For units with motor capacitor, loosen screw in strap holding capacitor to blower housing and slide capacitor from under strap.

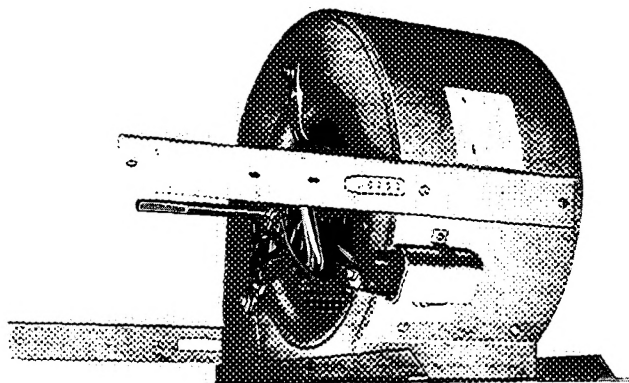


Fig. 14 — Dual Blower with Left-Hand Housing and Wheel Removed

10. Mark blower wheel, motor, and motor support in relation to blower housing before disassembly, to ensure proper reassembly.
11. Loosen setscrew holding blower wheel onto motor shaft.
12. Remove bolts holding motor mount to blower housing and slide motor and mount out of housing. Some motors have a ground wire attached to blower housing; disconnect it also.
13. Lubricate motor.
 - a. Remove dust caps or plugs from oil ports located at each end of motor
 - b. Use good grade of SAE 20 nondetergent motor oil and put 16 to 25 drops in each oil port
 - c. Allow time for total quantity of oil to be absorbed by each bearing.
 - d. After oiling motor, be sure to wipe excess oil from motor housing.
 - e. Replace dust caps or plugs on oil ports.
14. Remove blower wheel from housing
 - a. Mark blower wheel orientation and cutoff location to ensure proper reassembly.
 - b. Remove screws holding cutoff plate and remove cutoff plate from housing.
 - c. Lift blower wheel from housing through opening.
15. Clean blower wheel and motor by using vacuum with soft brush attachment. Care must be exercised not to disturb balance weights (clips) on blower wheel vanes. Also do not drop or bend wheel, as balance will be affected.
16. Reassemble blower by reversing procedures 14a-14c. Be sure wheel is positioned for proper rotation.
17. Reassemble motor and blower by reversing procedures 8-12. If motor has ground wire, be sure it is connected as before.
18. Reinstall blower assembly in furnace.
19. Reinstall vent enclosure back.
20. Reinstall vent pipe through opening in top plate, secure to draft hood and connect remainder of vent pipe assembly.
21. Reinstall vent enclosure front, and secure with screw.
22. Reinstall access panel

Cleaning Heat Exchanger — If it becomes necessary to clean the heat exchanger because of carbon deposits, soot, etc., proceed as follows:

1. Turn off gas and electrical supply to furnace.
2. Remove front access doors
3. Remove vent pipe enclosure front and flue pipe.
4. Remove draft diverter. Screws are located inside draft diverter opening.
5. Remove flue baffles from flue outlets of heat exchanger.
6. Remove secondary air shield and burners. To remove pilot burner, disconnect pilot supply tube at gas valve.
7. Clean flue ways with brush and/or vacuum. Check heat exchanger for leaks and cracks. Replace if necessary.
8. Replace flue baffles. Be sure all screws are in place and tight.
9. Replace draft diverter and vent connector. Be sure screws are replaced and tight.
10. Using vacuum with soft brush attachment, clean burners, then replace burners and secondary air shield.
11. Turn on electricity first, then turn on gas. Check for gas leaks.

⚠ WARNING

Never use a match or other open flame to check for gas leaks. Use a soap-and-water solution.

Pilot — See Fig. 15 Check the pilot and clean if necessary at the beginning of each heating season. The pilot flame should be high enough to light the burners. Remove the accumulation of soot and carbon from the sensing probe.

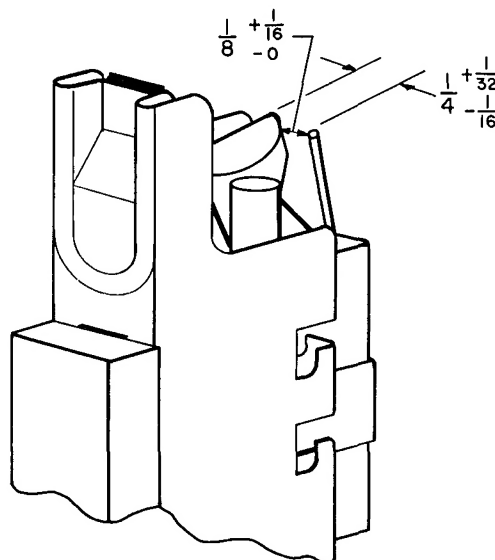


Fig. 15 — Position of Electrode to Pilot (in.)

Electrical Controls and Wiring

NOTE: There may be more than one electrical supply to unit

With power disconnected to unit, check all electrical connections for tightness. Tighten all screws on electrical connections. If any smoky or burned connections are noticed, disassemble the connection, clean all parts and stripped wire, and reassemble properly and securely. Electrical controls are difficult to check without proper instrumentation; therefore, reconnect electrical power to unit and observe unit through one complete operating cycle. If there are any discrepancies in the operating cycle, contact your dealer and request service.

Table 6 — Trouble Analysis Chart

⚠ WARNING

Turn off gas and power supply to unit before servicing (unless specific test requires gas and electric supplies)

SYMPTOM	CAUSE	REMEDY
Pilot will not light	No spark at electrode	Readjust, if necessary, so that gap between electrode tip and pilot burner is as shown in Fig. 15.
		Clean dirt or moisture accumulation from electrode ceramic with cloth
		Cracked ceramic — replace pilot electrode assembly
		Check for loose or broken wiring at and between spark generator and electrode. Replace wire or tighten connection as necessary
		Check fuse or circuit breaker for 115-volt supply to furnace.
		Check blower access panel for proper installation.
		Check 24-volt input to spark generator. If reading is 24 volts, and above steps have been completed, replace spark generator assembly

Table 6 — Trouble Analysis Chart (cont)

SYMPTOM	CAUSE	REMEDY
Pilot will not light (cont)	Spark shorting out to main burner	Readjust electrode as specified
	No gas at pilot burner	Clean pilot orifice
		Check voltage to terminals 3 and 5 of gas valve
		Check for proper opening of pilot valve, broken wires, or loose connections. If no deficiency is found, replace valve assembly
Burners will not ignite	No 115-volt power to furnace	Connect to power supply. Check fuse, wiring, or circuit breaker.
	No 24-volt power to control circuit	Replace transformer
	Miswired or loose connections	Check all wiring and all wire nut connections.
	No gas at main burners	Check voltage to terminals 1 and 2 of gas valve
		Check for proper opening of main gas valve, broken wires, or loose connections. If no deficiency is found, replace gas valve assembly
	Dirty pilot — yellow flame	Clean pilot orifice
Blower operates continuously	Thermostat fan switch in ON position	Move thermostat fan switch to AUTO. position.
	Fusible link blown	Correct combustion air and venting practice — replace fuse link with identical part
	Dirty filter causing limit operation	Clean dirty air filter — reinstall.
	Defective heat relay	Replace printed-circuit board.
Inadequate heating	Furnace undersized for application	Replace with proper size furnace.
	Gas input to furnace too low	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure or install correct orifices
	Limit switch cycles main burners	Clean dirty air filter — reinstall.
		Increase blower speed
		Open registers — ductwork restricted.
	Manual reset limit switch contacts open	Blower motor failure — replace motor.
	Thermostat anticipator set too low	Check thermostat circuit amps and set anticipator accordingly. See Fig. 8
Aldehyde odors, (CO), sooting flame — floating flame	Incomplete combustion — poor flame characteristics	Adjust air shutter on burners to provide soft, blue flame. Check all screws around flue outlets and burner compartment. Tighten
		See "Location & Air for Combustion & Ventilation" (Procedures for Gas-Fired Furnaces)
		Replace cracked heat exchanger
		Reduce input and check orifices — furnace overfired
		Check vent for restriction.



58DRC Counterflow Gas-Fired Furnaces

TO OBTAIN INFORMATION ON PARTS: Consult your installing dealer or classified section of your local telephone directory under the "Heating-Equipment" or "Air Conditioning Contractors & Systems" headings for dealer listing by brand name.
Have available the Model No., Series Letter, and Serial No. of your equipment to insure correct replacement part.